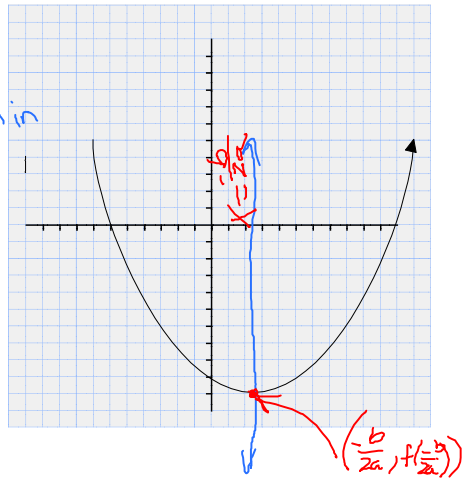
Unit 14
Day 3
The role of b

$y=ax^2+bx+c$

a) opens up or down
b) y-intercept
c) axis of symmetry *
d) minimum or maximum?
e) Value of the minimum or maximum
f) vertex
g) Find the x-ints (ie, roots zeroes)
h) Find 4th by evaluating and 5th through reflection
i) graph it!

* NOTE - See next 2 pages for algebraic derivation of the equation of axis of symmetry.

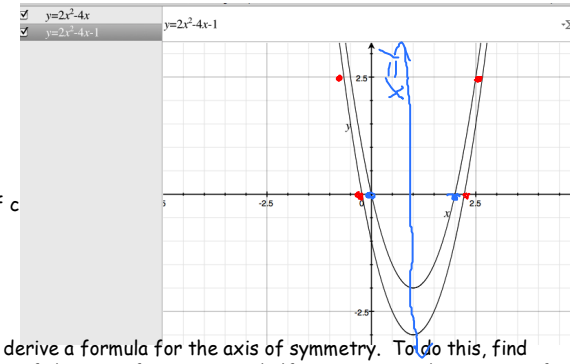


Consider the graphs of the following parabolas:

Do these parabolas have the same axis of symmetry?

What is the equation of this axis of symmetry?

Do you think that the value of c has an effect on the axis of symmetry?



Let's use the x-intercepts to derive a formula for the axis of symmetry. To do this, find the x-intercepts. The equation of the axis of symmetry is half-way between the any pair of symmetric points on the parabola.

$$y = ax^2 + bx$$
$$y = x(ax + b)$$
$$0 = x(ax + b)$$

The x-ints are

$$x = 0, \quad x = -\frac{b}{a} \longrightarrow \left(-\frac{b}{a}, 0\right) \text{ and } (0,0)$$

Since the axis of symmtry is half-way between the x-ints, we now know that the equation of the axis of symmetry is $x = -\frac{b}{2a}$. VOILA!

Ex1: $y=x^2+6x+5$

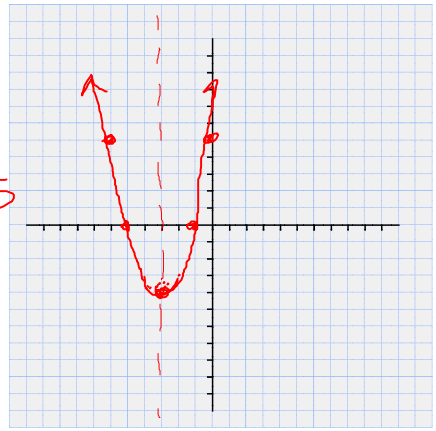
a) up b) 5 (0,5)

c) $x=\frac{-b}{2a}=\frac{-6}{2}=-3$

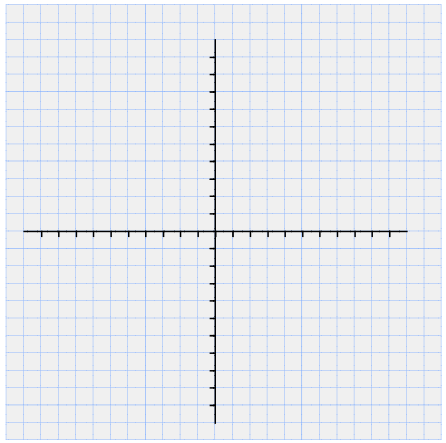
d) min

e) $f(-3)=(-3)^2+6(-3)+5$
$=-4$ (-3,-4)

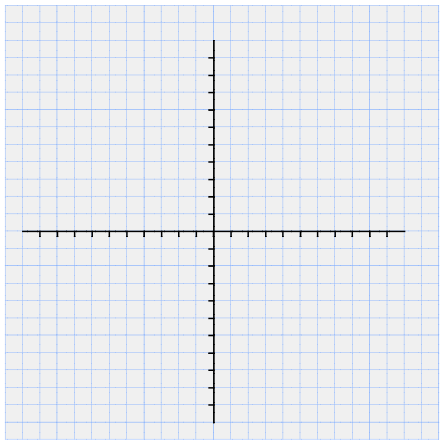
f) $0=x^2+6x+5$
$0=(x+5)(x+1)$
$x=-5,-1$
(-5,0), (-1,0)



Ex2: $y=-3x^2-2x+5$



Ex3: $y=2x^2-9x+4$



HW Wksht 1-8 all